Laparoscopic myomectomy and subsequent pregnancy: results in 54 patients

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The laparoscopic approach to myomectomy has raised questions about the risk of uterine rupture in patients who become pregnant following surgery. It has been suggested that the rupture outside labour in pregnancies following laparoscopic myomectomy can be due to the difficulty of suturing or to the presence of a haematoma or to the wide use of radio frequencies. In this paper we describe the pregnancy outcome of 54 patients submitted to laparoscopic myomectomy at our Institution and prospectively followed during subsequent pregnancies. A total of 202 patients underwent laparoscopic myomectomy. A total of 65 pregnancies occurred in 54 patients who became pregnant following surgery. Data were collected about complications of pregnancy, mode of delivery, gestational age at delivery and birthweight of the neonates. No cases of uterine rupture occurred. Twenty-one pregnancies followed an IVF procedure. Nine patients conceived twice and one three times. Four multiple pregnancies occurred. Eight pregnancies resulted in a first trimester miscarriage and another in an interstitial pregnancy requiring laparotomic removal of the cornual gestational sac. Of the remaining 56 pregnancies, 51 (91%) were uneventful. In two cases a cerclage was performed at 16 weeks. In two cases pregnancy-induced hypertension developed. Two pregnancies ended with a preterm labour (26–36 weeks). A Caesarean section was performed in 45 cases (54/57, 80%). In terms of the safety of laparoscopic myomectomy in patients who become pregnant following surgery, our results were encouraging. However, further studies are needed to provide reliable data on the risk factors and the true incidence of uterine rupture.

Key words: laparoscopic myomectomy/pregnancy/uterine rupture

Introduction

Several studies have evaluated the pregnancy outcome among patients who underwent myomectomy. In recent years laparoscopic myomectomy has become the elective procedure in selected patients. Laparoscopy effectively shortens the hospital stay and avoids the major risk of the classical route, i.e. adhesion formation (Bulletti et al., 1996; Dubuisson et al., 1998). Questions have been raised about how this new approach affects the outcome of pregnancies following surgery (Dubuisson et al., 1996; Durai et al., 1997; Nezhat et al., 1999; Ribeiro et al., 1999). The main concern regards the occurrence of uterine rupture during pregnancy as opposed to rupture during labour, which is a complication of the classic laparotomic intervention. However, there are few data on the subject and they are limited to reports of single cases or small series. It has been suggested that rupture in early third trimester could be due to the difficulty of suturing, the presence of a haematoma or to the wide use of radio frequencies.

In this paper we describe the pregnancy outcome of 54 patients submitted to laparoscopic myomectomy at our Institution and prospectively followed during subsequent pregnancies.

Materials and methods

Between June 1991 and June 1998, 202 patients underwent laparoscopic myomectomy at the Departments of Obstetrics and Gynaecology of the S.Anna Hospital and University Hospital of Turin. There was a 12–42 month follow-up in all cases. When performing a laparoscopic myomectomy the criteria we used in selecting the patients were that there should be ≤3 myomata and none of them must exceed 6 cm in diameter (8 cm when single).

Myomectomy was performed using the previously reported laparoscopic technique (Seiner et al., 1997). Briefly, two suprapubic access routes were employed. In order to obtain optimal exposure of the myoma, especially in posterior locations, uterine cannulation was performed in all cases. Ornithine-8-Vasopressin (POR 8; Sandoz, Berne, Switzerland) was injected around the myoma and scissors were used to incise the uterus down to the pseudocapsule of the myoma. Using claw forceps and scissors, the myoma was enucleated between the tumour and uterus, by entering into the cleavage plane. Then the uterine wall was sutured in one or two layers, according to the depth of the hysterotomy. The perimetrium was reconstructed with a running sero-serosal 318V polyglyactin suture (Vicryl 0; Ethicon, Rome, Italy) and an absorbable cellulose barrier (Interceed, TC7; Johnson and Johnson, Arlington, USA) was used to prevent adhesion formation. Antibiotics were administered postoperatively or given prophylactically 1 h prior to surgery. For each operation we prospectively collected data regarding the number, location, diameter and type (subserosal, intramural, submucosal) of the myomata removed. In addition we considered the type of the suture, opening the uterine cavity and associated operative procedures. Data were included in a database.

Fifty-four patients became pregnant following surgery. Three women were uniparous, 34 were nulligravid, 15 had had an
Table I. Characteristics of the myomata removed in patients who became pregnant

<table>
<thead>
<tr>
<th>No. of myomata removed</th>
<th>67</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of myomata &gt;3 cm</td>
<td>55</td>
</tr>
<tr>
<td>Mean size (cm, range)</td>
<td>3.9 (3–8)</td>
</tr>
<tr>
<td>Type of myomata (&gt;3 cm)</td>
<td></td>
</tr>
<tr>
<td>Intramural</td>
<td>28</td>
</tr>
<tr>
<td>Subserosal</td>
<td>26</td>
</tr>
<tr>
<td>Submucosal</td>
<td>1</td>
</tr>
<tr>
<td>Location of myomata (&gt;3 cm)</td>
<td></td>
</tr>
<tr>
<td>Anterior</td>
<td>14</td>
</tr>
<tr>
<td>Posterior</td>
<td>19</td>
</tr>
<tr>
<td>Fundal</td>
<td>22</td>
</tr>
</tbody>
</table>

cornual gestational sac. Of the remaining 57 pregnancies, 51 (91%) were uneventful. In two cases a cerclage was performed at 16 weeks. Pregnancy-induced hypertension developed in two cases. Two pregnancies ended with a preterm labour (at 26 and 36 weeks). An elective Caesarean section was performed in 45 cases (45/56, 80%). The indications were: previous Caesarean section (n = 8), breech presentation in primipara (n = 2), fetal distress (n = 1), pregnancy-induced hypertension (n = 2), multiple pregnancy (n = 4), premature rupture of the membrane (n = 4). In the remaining 24 cases the Caesarean section was decided because of previous myomectomy and/or infertility.

Mean birthweight was 3192 g (640–4595). In three cases the fetus was macrosomic (>4500 g). None of the neonates was small for gestational age. Only one adhesion was found at the site of myomectomy in the 37 patients undergoing a first Caesarean section.

Discussion
Myomectomy is a challenging procedure because it involves the reconstruction of an organ that can undergo remarkable structural changes, as it does in pregnancy. The literature documents normal reproductive performance of uteri after laparotomic myomectomy (Davids, 1952; Loeffler and Noble, 1970; Sudik et al., 1996; Li et al., 1999). Uterine rupture following laparotomy is a rare event and generally only reported in single case reports or in small series (Garnet, 1964; Palerme and Friedman, 1966; Golan et al., 1990).

To our knowledge this is one of the largest series of pregnancies to be followed up after laparoscopic myomectomy.

There were no occurrences of uterine rupture during pregnancy in our patients. This cannot be ascribed to the high incidence (80%) of Caesarean sections, because all cases of uterine rupture described in pregnant patients after laparoscopic myomectomy (Harris, 1992; Dubuisson et al., 1995; Mecke et al., 1995; Friedman et al., 1996; Arcangeli and Pasquarette, 1997; Pelosi III and Pelosi, 1997) occurred early in the third trimester (28–36 weeks of gestational age), whereas in our series all patients were delivered after 36 weeks.

One possible cause of uterine rupture after laparoscopic myomectomy is the wide use of electrosurgery which may result in poor vascularization and tissue necrosis with an adverse effect on scar strength (Elkins et al., 1987; Nezhat et al., 1996). Electrosurgery was used to remove the myoma and obtain haemostasis in five out of the six reported uterine ruptures. In one case the uterus ruptured at 26 weeks following laparoscopic myolysis of a 3 cm intramural myoma (Arcangeli and Pasquarette, 1997). Myolysis is an endoscopic technique in which the tumour is coagulated with the help of bipolar probes inserted into the myoma. In the reported case there was no suture of the uterine wound. The large defect of the uterus detected at laparotomy could have been related to the wide thermal damage peculiar to the technique in addition to the absence of uterine closure. As previously described (Seinera et al., 1997), we

abortion and two an ectopic pregnancy. Indications for surgery were: growing myoma (n = 12), infertility (n = 41) and abnormal bleeding (n = 1).

The patients were followed up once a month as generally occurs in a normal pregnancy. They were submitted to routine ultrasound examinations at 20 and 32 weeks. For each pregnancy we collected the following data: whether the pregnancy was spontaneous or induced; the time lag between surgery and pregnancy; complications of pregnancy: mode of delivery; gestational age at delivery; birthweight of the neonates.

Table I summarizes the type, size and number of myomata removed in the patients who became pregnant. In four cases the uterine cavity was entered: this was demonstrated by the appearance of the uterine mobilizer probe (two cases) or by finding endometrium in the depth of the incision. The myoma was submucosal in only one case. Operative hysteroscopy was not considered appropriate in the remaining cases of uterine scar. 1995; Mecke

- Mean size (cm, range) 3.9 (3–8)
- Type of myomata (>3 cm)
  - Intramural 28
  - Subserosal 26
  - Submucosal 1
- Location of myomata (>3 cm)
  - Anterior 14
  - Posterior 19
  - Fundal 22

Results
Among the 202 patients who underwent laparoscopic myomectomy 10 (5%) were lost to follow-up.

A total of 65 pregnancies were achieved in 54 patients. No uterine rupture occurred. Twenty-one of the 65 pregnancies followed an IVF procedure. Nine patients conceived twice and one conceived three times. The time interval between surgery and the first pregnancy ranged between 1 and 26 months (mean 9). Four multiple pregnancies occurred: one triplet pregnancy and three sets of twins. Eight pregnancies resulted in a first trimester miscarriage and another in an interstitial pregnancy requiring a laparotomic removal of the
never use radio frequencies to achieve haemostasis during or after the cleavage of the myoma. Haemostasis is only obtained by the initial injection of a vasoconstrictor and suturing.

It has been speculated that haematoma formation and/or the suturing technique could affect the occurrence of the complication (Nezhat et al., 1996). However, no indication is given about these issues in the described cases of uterine rupture.

A haematoma can make the uterine wall fragile by means of fibrous haematoma (Dubuisson et al., 1995). We did not find any haematoma in a series of 30 cases followed post-operatively by ultrasound, as previously reported (Seinera et al., 1996). Patients who are planning future pregnancies. We also suggest that there should be an extremely accurate description of the laparoscopic technique when the follow-up reports are published.

As far as suturing is concerned, the problem is the correct reapproximation of the edges of incision. This precaution is necessary to diminish the likelihood of healing by secondary repair. Some authors (Williams, 1921; Schwartz et al., 1938) stated that the myometrial wound heals by regeneration of the muscular fibres, while scars appear only in cases of healing by secondary repair. Considering that smooth muscle regenerates very poorly, it is possible that connective tissue is primarily responsible for replacing and linking together the damaged muscular fibres (Wojdecki and Grynsztajn, 1970). Our suture is sero-serosal and as a result the edges of the uterine wound are always inverted. In an animal model, different uterine closure techniques were evaluated regarding the histological healing response (Dunnihoo et al., 1989). It is interesting to note the differences between inverted and everted suture techniques. In the latter group, endometrial glands were present superficially in 28.6% of the incisions, whereas none of the incisions closed by inversion showed the presence of endometrial glands. Endometrial glands in the uterine scar could make the wall fragile during subsequent pregnancy. Even though caution should be exercised when extrapolating such results to humans, this fact would suggest the necessity of suturing the uterine wound by inverting the edges of the myometrium.

Other reasons for the uneventful course in our patients could be because the uterine cavity was rarely opened during myomectomy (4/65, 6%) and because there was a 9 month mean lag time between surgery and pregnancy. A short time interval could be a risk factor for the incomplete healing of the uterine scar, but there are no data to support this hypothesis.

Of course our results could be a chance finding. We know that there is a low risk of uterine rupture in labour after a previous Caesarean section (0.3–2.2%) (Phelan et al., 1987; Farmer et al., 1991; Flamm et al., 1994; McMahon et al., 1996). If the incidence of uterine rupture during pregnancy after laparoscopic myomectomy proves to be of the same magnitude or even slightly higher, the reason why we found no case of rupture could be explained by the small size of our sample. Moreover, our criteria of patient selection could have contributed to the absence of rupture by excluding those patients with large and numerous myomata, where the uterus has a wider myometrial wound.

The majority of women in our series had a Caesarean section (80%). This figure could be influenced by the high incidence of pregnancies following an IVF procedure (37%). Previous myomectomy and/or infertility were indications for almost half of the elective Caesarean sections performed (24/45). These are not absolute indications for the abdominal route. However, worries by both patients and their gynaecologists could play a more decisive role than actual pathological indications.

In conclusion, while our data seem to be reassuring, further studies are needed to provide reliable information about the risk factors and incidence of uterine rupture, which will help to give surgical counselling to women who are planning future pregnancies. We also suggest that there should be an extremely accurate description of the laparoscopic technique when the follow-up reports are published.

References
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